CLAIM AMENDMENTS

1. (Currently Amended) A knocking detection apparatus comprising:

spark plugs disposed in cylinders of an internal combustion engine;

ion current detecting means for detecting ion currents flowing in the spark plugs;

time-frequency transforming means for setting time intervals allowing at least one ~~or more overlaps~~ overlap within a time from after ignition by one of the spark plugs ~~to~~ until ~~it's own~~ the spark plug in the respective cylinder or in another cylinder next ignites, and sampling ~~current values of~~ the ion currents in the respective time intervals to determine the time-frequency components ~~thereof~~ of the ion currents;

knocking detecting means for detecting knocking based on ~~the basis of~~ the time-frequency components; and

detection control means for inputting ~~a~~ running status and controlling the time-frequency transforming means and the knocking detecting means.

2. (Currently Amended) The knocking detection apparatus of claim 1, wherein the time-frequency transforming means uses a ~~short-time~~ fast Fourier transform to analyze frequency components.

3. (Original) The knocking detection apparatus of claim 1, wherein the time-frequency transforming means uses a wavelet transform to analyze frequency components.

4. (Currently Amended) The knocking detection apparatus of claim 1, wherein the knocking detecting means detects ~~the~~ occurrence of knocking and ~~the~~ timing of knocking occurrence.

5. (Currently Amended) The knocking detection apparatus of claim 1, wherein the detection control means changes at least one ~~or both~~ of (i) sampled times where the time-frequency transforming means samples ion ~~current values~~ currents in accordance with the running status of the internal combustion engine and ~~an~~ (ii) ion current sample number serving as ~~the~~ a target of time-frequency transformation.

6. (Original) The knocking detection apparatus of claim 1, wherein resistance with respect to impulse noise and ion current intensity changes is raised by dividing, by a standard factor, a knocking determination equation that the knocking detecting means computes.

7. (Currently Amended) A knocking detection method including:

~~ion current detecting means for~~ detecting ion currents using spark plugs disposed in cylinders of an internal combustion engine;

~~time-frequency transforming means for~~ setting time intervals allowing at least one ~~or more overlaps~~ overlap within a time from after ignition by one of the spark plugs ~~to~~ until ~~its own~~ the spark plug in the respective cylinder or in another cylinder next ignites, and sampling ~~current values of~~ the ion currents in the respective time intervals to determine the time-frequency components ~~thereof~~ of the ion currents; and

~~knocking detecting means for~~ detecting knocking based on ~~the basis of~~ the time-frequency components ~~; and detection control means for controlling the time-frequency transforming means and the knocking detecting means, wherein the detection of knocking is conducted~~ by ~~the detecting control means~~ inputting ~~a~~ running status of the internal combustion engine and controlling the time-frequency transforming ~~means and the knocking detecting means~~ to determine time-frequency components from ~~sampled values of~~ the ion currents sampled.

8. (Currently Amended) The knocking detection method of claim 7, ~~wherein the~~ including time-frequency transforming ~~means uses~~ using a ~~short time~~ fast Fourier transform ~~to analyze frequency components~~.

9. (Currently Amended) The knocking detection method of claim 7, ~~wherein the~~ including time-frequency transforming ~~means uses~~ using a wavelet transform ~~to analyze frequency components~~.

10. (Currently Amended) The knocking detection method of claim 7, ~~wherein the knocking detecting means detects the~~ including detecting occurrence of knocking and the timing of knocking occurrence.

11. (Currently Amended) The knocking detection method of claim 7, ~~wherein the detection control means changes~~ including changing at least one ~~or both~~ of (i) sampled times ~~where the time-frequency transforming means samples~~ while sampling ion ~~current values~~ currents in accordance with the running status of the internal combustion engine and ~~an~~ (ii) ion current sample number serving as ~~the~~ a target of the time-frequency ~~transformation~~ transforming.

12. (Currently Amended) The knocking detection method of claim 7, ~~wherein~~ including raising resistance ~~with respect~~ to impulse noise and ion current intensity changes ~~is raised~~ by dividing, by a standard factor, a knocking determination equation ~~that the knocking~~ used in detecting ~~means computes~~ knocking.